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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/559,903	04/26/2000	Zhiping Yin	MI22-1427	1798

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EXAMINER

ECKERT II, GEORGE C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 11/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
09/559,903

Applicant(s)  
Yin et al.

Examiner  
George C. Eckert II

Art Unit  
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Aug 23, 2002
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 27, 33, 36, and 37 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27, 33, 36, and 37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 12, 13, 15 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s): 2-13-11 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Response to Amendment*

1. Applicant's amendment dated August 23, 2002 in which claims 23-26, 28-32 and 34-35 were canceled, claims 27 & 33 were amended and claims 36-37 were newly added has been entered of record in the file.

### *Claim Rejections - 35 U.S.C. § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 27, 33, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,133,613 to Yao et al. (of record) in view of US 5,883,011 to Lin et al. (of record). Yao et al. teach, with reference to figure 5, a gate stack comprising:

a polysilicon layer 504 over a semiconductive substrate 502;

a metal silicide layer 506 over the polysilicon;

a layer comprising  $\text{Si}_x\text{N}_y\text{O}_z$  over and in physical contact with the metal silicide; and

a silicon nitride layer 510 on the layer of  $\text{Si}_x\text{N}_y\text{O}_z$ .

Yao et al. do not expressly teach a gate oxide layer on the polysilicon layer. However, use of an oxide layer adjacent a polysilicon layer is considered obvious in the art as such oxide layer is

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used for insulating a polysilicon layer (to be used as a gate electrode) from a semiconductive substrate (to be used as an active region). Indeed the acronym MOS, prolific in the art, indicates a layered device necessarily including metal (in this case polysilicon), oxide, and semiconductor layers. As such, the use of a gate oxide layer in the device of Yao et al. is considered obvious.

Yao et al. are also silent as to the specific ratios of silicon, nitrogen and oxide (e.g. the values of x, y and z) in the  $\text{Si}_x\text{N}_y\text{O}_z$  layer. Lin et al. teach, with reference to column 6, lines 4-24, a process in which  $\text{Si}_x\text{N}_y\text{O}_z$  is formed as an antireflective layer (note that the subscripts have been changed to mimic those used in the instant claims to make comparisons easier). Lin et al. teaches that  $x = 0.5$  (which is in the range of 0.39 to 0.65),  $y = 0.12$  (which is in the range of 0.02 to 0.56) and  $z = 0.3$  (which is in the range of 0.05 to 0.33).

Regarding the specific values of claims 36 and 37, these too are considered obvious in light of Yao et al. and Lin et al. That is, Yao et al. teach that the  $\text{Si}_x\text{N}_y\text{O}_z$  layer is to be used as an antireflective layer (col. 1, lines 38-40, col. 2, lines 7-9). Yao et al. next teach that the "precise optical characteristics of the antireflection film, preferably formed from oxynitride ( $\text{SiN}_x\text{O}_y$ ) is dependent upon the recipe of the process for forming the oxynitride film" (col. 2, lines 10-13). Finally, Yao et al. specifically teach that the optical characteristics can be determined by controlling the flow rates and thus ratios of silicon, nitrogen and oxygen (col. 4, lines 44-49).

Based on these teachings, applicant's instant claims including specific ratios of silicon, nitrogen and oxygen are considered obvious as they are merely optimizations of the variables taught by Yao et al. Moreover, the instant specification is absent any evidence that the values

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now claimed by applicant produce unexpected results. *In re Huang*, 40 USPQ2d 1685 (Fed. Cir. 1996) (claims for sports equipment grip, in which layers have thickness ratios in ranges higher than prior art, held *prima facie* obvious over prior art since modification, even if it results in great improvement over prior art, may still not be patentable if it was within capabilities of one skilled in art, unless claimed ranges produce new and unexpected result different in kind and not merely degree from results of prior art). Furthermore, the teaching of Yao et al. *does* teach flow rates of both SiH<sub>4</sub> (35 - 75 sccm) and N<sub>2</sub>O (70 - 120 sccm) (col. 4, lines 27-29) which overlap those flow rates taught by applicant: SiH<sub>4</sub> (40 - 300 sccm) and N<sub>2</sub>O (80-600 sccm) (page 9, lines 1-5). In all, that the instant claims include citations of specific ratios is not considered patentable over Yao et al. in view of Lin et al.

With regard to claim 33, Yao et al. teach that the layer comprising Si<sub>x</sub>N<sub>y</sub>O<sub>z</sub> is between 250 and 650 Å thick (col. 4, line 34).

Yao et al. and Lin et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the ratios as taught by Lin et al. in the layer taught by Yao et al. The motivation for doing so, as is taught by Lin et al., is that such a ratio used in the Si<sub>x</sub>N<sub>y</sub>O<sub>z</sub> layer is well known in the art when Si<sub>x</sub>N<sub>y</sub>O<sub>z</sub> is used as an antireflective layer (col. 4, lines 22-37). Therefore, it would have been obvious to combine Yao et al. with Lin et al. to obtain the invention of claims 27, 33, 36 and 37.

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***Response to Arguments***

3. Applicant's arguments filed August 23, 2002 have been fully considered but they are not persuasive. Applicant argues as to the combination of Yao et al. and Lin et al., essentially relying on the fact that, because the  $\text{Si}_x\text{N}_y\text{O}_z$  layer of Lin is a sacrificial layer, the combination with Yao et al., whose  $\text{Si}_x\text{N}_y\text{O}_z$  layer is not sacrificial, must be flawed. The examiner cannot agree.

While it is acknowledged that the  $\text{Si}_x\text{N}_y\text{O}_z$  layer taught by Lin is removed in later processing, it must also be acknowledged that the same  $\text{Si}_x\text{N}_y\text{O}_z$  layer is taught by Lin as included for its *anti-reflective* quality (col. 1, lines 14-18). It must further be acknowledged that the disclosure of Yao is expressly concerned with *anti-reflective* films and their specific compositions. The disclosure of Lin was relied on not for teaching a specific process, but for its teaching of a specific composition of  $\text{Si}_x\text{N}_y\text{O}_z$ . That the disclosure of Lin teaches the layer as ultimately removed does not preclude its combination with Yao which teaches the layer as ultimately included in the final structure. Rather, the combination is valid based on Yao's concern for certain ratios of  $\text{Si}_x\text{N}_y\text{O}_z$  and Lin's teaching of such a ratio. In all, Yao and Lin are not non-analogous art merely because their final structures are different. Because Yao teaches the final structure as instantly claimed, and because Lin motivates a change to that structure, their combination is acceptable.

Applicant also argues certain other benefits achieved from using a  $\text{Si}_x\text{N}_y\text{O}_z$  layer in the final device. First of all however, no such benefits were included in the structure of the instant claims (e.g. a specific stress between the layers was not claimed). Secondly, the structure of Yao does

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teach a final device having a  $\text{Si}_x\text{N}_y\text{O}_z$  layer which also provides stress relief between the layers. In all, such considerations are not persuasive.

### *Conclusion*

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Eckert II whose telephone number is (703) 305-2752.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Eddie Lee can be reached on (703) 308-1690. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

GCE  
November 4, 2002

  
**GEORGE ECKERT**  
**PRIMARY EXAMINER**